with his own hands from Sheppey, Alum Bay, Bournemouth, Reading, Mull, Antrim, and many other localities, but has already favoured us with several memoirs in the Palæontographical Society's annual volumes and elsewhere on the British Eocene flora, we may hope before long to have a more complete history at this period of our islands than we already possess of the flora of the Carboniferous age.

Nor has any research, favoured by the aid of this Association, brought so large a return in beautiful and instructive specimens to our National Museum of Natural History as have the investigations carried out by Mr. J. S. Gardner.

We must not omit to mention Mr. Clement Reid, who has so diligently traced many of the specimens of our existing flora in the Pleistocene strata of the eastern counties.

"Large numbers of ferns and gymnosperms," says Mr. Gardner, "have been discovered in Mesozoic rocks, but remains of the interesting monocotyledons which must have accompanied them are provokingly scarce. We know that palms, grasses, &c., appear at certain definite horizons, but we are ignorant regarding their ancestry. We know that temperate floras, largely composed of dicotyledons, flourished as far north as man has been able to penetrate, in the Cretaceous and Tertiary periods, but nothing in the least suggesting a transitional form has been found amongst them. Lastly, we have learnt that floras now indigenous to Japan and the Himalayas, to Australia and South America, once inhabited Europe, groups of wholly different plants succeeding and displacing each other in such rapid succession on the same spot as to suggest that the normal condition of floras is one of slow but perpetual migration, and that the term 'indigenous' has no geological significance."

In reference to the question of geographical distribution of organized beings in geological time, the conclusion is strongly forced upon us, from a study of fossil remains, that the great zoological provinces into which the earth's surface and the seas of the globe are now subdivided have been brought about by the limitation of species at no more distant date than the Secondary period, and probably even later than this.

That in Palæozoic times there must have been a great uniformity of marine conditions, and the fauna of each of the primary formations was consequently not only of vast duration but of world-wide extent, is evident.

When, as in Carboniferous times, we are enabled to study the contemporary land conditions of the globe, we find they must also have been very uniform, at least so far as the explored parts of this hemisphere are known, both the fauna and the flora at this epoch being co-extensive with the northern hemisphere, indeed, in all probability far wider, seeing that identical species occur in the Carboniferous series of Australia and North America. Even those well-marked lines which at present follow more or less closely the isotherms of our hemisphere seem not to have exercised the same influence on the fauna and flora as they do at present. Thus in high northern latitudes and within the Arctic Circle we find abundant evidence of life in Palæozoic, Mesozoic, and even down to Tertiary times, unaffected by latitude; so that we are justified in assuming that a far milder temperature extended to much higher northern regions than that which at present exists on the globe, and consequently that a larger portion of the earth's surface (as well as its seas) was then habitable.

How great, then, is the field of research still open to our investigation, and how far distant must that day be ere the last problem shall have been solved, and the last chapter written, in the ancient life-history of our earth!

> "We write in sand, our labour grows,
> And with the tide the work o'erflows."

With unskilled hand I have struck here and there only a few chords on the many-toned harmonicon of geology. I fear they may not all have vibrated quite in unison as a perfect composition would; but, however crude the performance has been, I trust that it will not be provocative of discord. If some few ideas suggest themselves as worthy of your acceptance, I shall not have spoken altogether idly, nor you have listened so long and so patiently entirely in vain.

NOTES.

Dr. Emil Holub has arrived in Europe, after three years of adventurous exploration in Africa, and although he brings with him only a part of his scientific collections—the rest having been plundered by the Mashukulumbe, a tribe to the north of the Zambesi—yet this fragment is certain to prove of great scientific value. It includes over 2000 specimens of birds, 27,000 of insects, and 6500 of plants. Dr. Holub brings with him also many hundred observations in meteorology and measurements of all nations. The collection will be exhibited in Europe; and it is stated that, if circumstances enable them to do so, Dr. and Mrs. Holub will resume their African explorations. They are expected to arrive in Vienna on the 15th or 16th inst., and will be officially received by the Austro-Hungarian Exploration Society.

A slight shock of earthquake was felt at Bonn and in its vicinity at fifty-two minutes past four on Monday afternoon, accompanied by a dull subterranean rumbling.

The Government of India has sanctioned the purchase for the Lahore Museum of a zoological collection illustrative of Indian silk culture.

M. Pavie, who undertook an adventurous journey from Siam into Tonquin, starting from Luang Prabang, has been compelled to return to Siam, having been driven back by bands of Chinese, who are described as ravaging the country.

Mr. J. B. Lillie Mackay, of the Royal School of Mines, and at present Lecturer in Chemistry at Trinity College, Melbourne University, has been appointed Director of the School of Mines, Sandhurst, Victoria.

Mr. Omond, the Superintendent of the Ben Nevis Observatory, replying in the *Times* to criticisms in Parliament of the work of the Observatory, to which we referred in a note last week points out that the report of the Meteorological Office, on which these criticisms were based, merely states that Mr. Omond's telegrams were useless for a particular purpose, viz. forecasting storms. He then proceeds to state the position of the Observatory in the matter as follows:—"When the Ben Nevis Observatory was opened at the close of 1883, the directors offered to send the Meteorological Office daily weather telegrams—the only satisfactory way in which observations can be used for forecasting. The Office declined this offer, mainly on the ground of expense, but asked that occasional messages might be sent when any unusual or interesting events occurred, adding that these messages might be sent more frequently at first. I had some difficulty in understanding why the Office wished a record of sudden changes to be sent by wire instead of waiting till they got them in the ordinary way by post, but considered that the best way was to follow their instructions literally and send telegrams recording sudden changes or unusual occurrences, with a due regard to economy and with gradually diminishing frequency. A reiterated request for economy at the time of the introduction of sixpenny messages led to the entries sent being usually restricted to two hours' reading of the various instruments —one before the change in question had set in and one after it was fairly established. Though most sudden changes are connected with storms, yet a few of the messages recorded changes from bad to good weather, especially when the occasional great dryness characteristic of high-level stations began suddenly or in any unusual manner. How a Committee, 'composed of men of the very highest scientific standing,' had come to regard these messages, and especially this last sort, as 'storm-warnings' passes my comprehension. The question of the value to meteorological science of the Ben Nevis observations I may safely leave to abler hands—it needs no vindication of mine; but I must protest against the unfairness to me and the other members of the Ben Nevis Observatory staff of first asking for records of changes which have occurred, and then declaring them useless because they are not also forecasts of what is to be. It should be noted, however, that in two cases the record from Ben Nevis arrived at the

Meteorological Office before the warning from the sea-level stations—a fact which proves, all the more conclusively because unintentionally, the great value Ben Nevis would have if properly utilized as a forecasting station by means of daily reports sent to some one able both to interpret their indications and to compare them with similar daily reports from low-level stations all over the country. The former of these conditions can only be fulfilled by those who have studied the Ben Nevis records of the last three years and a half, while the latter in this country necessarily is limited to the Meteorological Office, which alone receives such daily telegrams. It is to this unfortunate hiatus and not to any defect in the position of Ben Nevis that the alleged uselessness for practical forecasting of its observations is due." Mr. Omond's vigorous defence is therefore the same in substance as that of Mr. Buchan which we reproduced last week. It amounts to this: the Observatory is blamed for not doing certain work which it offered to do, but which the Meteorological Office refused to permit it to do; Mr. Omond did what he was asked, and did not do that which the Meteorological Council refused to have from him on the score of expense.

THE Committee of the International Geological Congress dealing with the question of geological nomenclature is holding its meeting in Manchester at the same time as the British Association. The representatives at present in Manchester are Prof. G. Capellini, Rector of the University of Bologna, and representative of Italy (President); Prof. Dewalque, Belgium (Secretary); Prof. O. Torell, Sweden; Prof. Vilanova-y-Piera, Spain; Dr. T. Sterry Hunt, Canada; Dr. W. T. Blanford, India; and Prof. T. McK. Hughes, England. Meetings of the Committee, at which the foregoing were present, were held in the Committee-room of the Geological Section on Tuesday and Wednesday last week, at which Mr. J. E. Marr and Mr. W. Topley, of the English International Committee, were also present. The object of this Committee of the Congress is to discover the nomenclature and classification adopted by different authorities and in different countries, with the view of bringing their views into harmony, and also to lay down rules for the guidance of geological workers in the future. The subject chiefly discussed has been the classification of the Cambrian and Silurian rocks, some reference having also been made to the question of the Archæan rocks. The full Congress will meet in England next year, when these and other similar matters will be considered. Another meeting of the Congress Committee was held on Friday.

THE autumn meetings of the Iron and Steel Institute are announced to take place this year at Manchester. They will be held at Owens College, the use of which has been granted by the Governors for the occasion, and will begin on the morning of September 14. The programme is a very comprehensive one viewed from a metallurgical and manufacturing point of view, while the more strictly holiday features of such a gathering have not been neglected. The President of the Institute (Mr. Daniel Adamson), will give a paper on "Machines for the Testing of Metals," a subject to which he has devoted a great deal of attention. Mr. Thomas Ashbury is down for a paper on "Recent Metallurgical and Mechanical Progress, as illustrated at the Manchester Exhibition," and as that Exhibition, so far as relates to machinery in motion, is probably the best that has ever been held, and illustrates with unusual completeness every department of the engineering art, such a paper can scarcely fail to be an instructive and valuable record. A third paper will be read by Mr. James Johnson, on "The Mechanical Apparatus for Continuous Moulding at the Works of M. Godin, at Guise," the interest of which will be of a two-fold character—first, as regards the processes and apparatus to be described, which are of a novel and improved character; and, secondly, as regards the system of co-operation which has been adopted there on a more complete and successful scale as between employers and employed than probably in any other part of Europe. Dr. Fleming, of University College, London, will contribute a paper on "Electric Light Installations for Works and Factories," a subject with reference to which he has had a very large amount of experience as the consulting engineer for the Edison-Swan and other companies. The manufacture of ordnance, respecting which there has been so much discussion in military and political circles of late, will be brought forward by Capt. Cubillo, who occupies a responsible position at the Royal Arsenal of Trubia, in Spain. Capt. Cubillo has studied the conditions of the manufacture of ordnance at all the leading arsenals both in this country and abroad, and as the Spanish Government has recently exhibited a strong disposition to be abreast of the world in naval and military affairs, this paper is likely not only to show what they have so far achieved, but also to bring to the front comparisons with reference to ordnance that will probably be extremely useful and interesting at the present time. One other paper, that by Mr. Wailes, of the Patent Shaft and Axle-tree Company, at Wednesbury, promises to give to the world some extremely interesting data respecting the recent progress of the basic process for the manufacture of steel on the open hearth. Hitherto, as is well known, the progress of this system, both on the Continent and in England, has been chiefly in the direction of Bessemer working, but recently the open hearth has come into competition with the Bessemer process for this purpose, and Mr. Wailes's paper will probably lead to a discussion as to the comparative merits of the two systems which will be of value both to producers and consumers of steel.

THE *Times* Correspondent in Philadelphia telegraphed on Monday night that an International Medical Congress was formally opened by President Cleveland at Albaugh's Opera House in Washington on Monday. Five thousand physicians are in attendance, including over 2000 delegates sent here from nearly all parts of the globe. One of those present, Dr. Fanny Dickinson, of Chicago, is the first woman who has been admitted to an international medical gathering as delegate. Many of the most distinguished doctors of the day were present. An address of welcome was delivered by Mr. Bayard, Secretary of State. The welcome was acknowledged and responded to by Dr. William Harris Lloyd, Inspector-General R.N., on behalf of Great Britain; Dr. Léon Laforte, of Paris, on behalf of France; Prof. P. G. Unna, of Hamburg, on the part of Germany; Senator M. Semmola, of Naples, for Italy; and Dr. Charles Reyber, of St. Petersburg, representing the Government of Russia.

THE centenary of the first ascent of Mont Blanc was celebrated at Chamounix on the 28th ult., when a monument for which the various Alpine and tourist clubs of the world, as well as the Paris Academy of Sciences, contributed the funds, was at the same time unveiled to De Saussure, who made the ascent on August 28, 1787, with the guide Jacques Balmat. The monument is of bronze on a granite pedestal. The principal feature of the procession with which the proceedings opened was the band of old guides, forty in number, and all over seventy years of age. M. Spuller, French Minister of Education, unveiled the statue, and delivered an oration in honour of De Saussure.

CONSIDERABLE additions have recently been made to our knowledge of those interesting substances, the chemical products of the action of Bacteria upon the animal body, called ptomaïnes. In the last number of the *Berichte* of the German Chemical Society, p. 2217, Dr. Ladenburg clears up completely all doubt as to the composition of one of the best known of the ptomaïnes, cadaverin, which he shows is perfectly identical with artificially prepared penta-methylene-diamine. A short time ago Dr. Bocklisch published (*Ber.* 1887, p. 1441) the results of his researches upon the products of the action of Finkler's bacillus (*Vibrio proteus*) upon sterilized flesh, showing that this bacillus decomposes flesh with formation of the alkaloid cadaverin, $C_5H_{14}N_2$, which is non-poisonous, and ammonia. On repeating his experiments, however, in presence of ordinary putrefaction germs in addition to the Finkler bacilli, he made the remarkable discovery that an entirely different base, methyl-guanidine, of intensely poisonous properties, was the chief product; hence the symptoms of particular diseases may be due to the poisonous alkaloids formed by the joint action of specific bacilli and ordinary putrefaction germs. Bocklisch made several analyses of the cadaverin which he obtained in the first series of experiments, due to the action of pure cultivations of the *Vibrio proteus*, and showed that its hydrochloride forms a crystalline compound with mercuric chloride of the composition $C_5H_{14}N_2.2HCl.4HgCl_2$, and as this differed somewhat from the composition formerly assigned to the artificial preparation by Ladenburg, the subject was involved in some doubt. Happily, Ladenburg has made fresh and purer preparations of his penta-methylene-diamine, and finds that its compound with mercuric chloride has precisely the composition assigned to the double chloride of mercury and cadaverin by Bocklisch. Hence cadaverin is conclusively proved to be none other than penta-methylene-diamine, and, consequently, must be added to the list of products of animal life which have been synthesized. The formation of these alkaloids, during disease or after death, has a most important bearing upon the treatment of cases of suspected poisoning, inasmuch as, whether poisonous or not, their reactions differ very little from those of the deadly alkaloids; and in the interests of justice it is to be hoped that our knowledge of this branch of organic chemistry may soon be rendered as complete as possible.

MESSRS. MACMILLAN announce the following scientific works for the forthcoming publishing season:—"Electricity and Magnetism," by Amédée Guillemin, translated and edited, with additions and notes, by Prof. Silvanus P. Thompson; "The Nervous System and the Mind," by Charles Mercier; "Popular Lectures and Addresses on Various Subjects in Physical Science," by Sir William Thomson; "Radiant Light and Heat," by Balfour Stewart, F.R.S. (the last three belonging to the Nature Series); "Kinematics and Dynamics," by J. G. Macgregor; "Geometrical Conics," by A. Cockshott and Rev. F. B. Walters; "A Treatise on Analytical Statics," by I. Todhunter, F.R.S., a new edition, revised by Prof. J. D. Everett, F.R.S.; "A Key to Mr. Todhunter's Conic Sections," by C. W. Bourne; "A Key to some Examples in Messrs. Jones and Cheyne's Algebraical Exercises," by Rev. W. Failes; "A Key to Mr. Lock's 'Arithmetic for Schools,'" by the Rev. R. G. Watson; "A Companion to 'Weekly Problem Papers,'" by the Rev. John J. Milne; "A Key to Dr. Todhunter's Treatise on the Differential Calculus," by H. St. J. Hunter; "A Treatise on Chemistry," by Sir H. E. Roscoe, F.R.S., and C. Schorlemmer, F.R.S. (Vol. IV. Part I.); "Algebra for Schools and Colleges," by Charles Smith; "The Elements of Chemistry," by Ira Remsen; "Absolute Measurements in Electricity and Magnetism," by Andrew Gray; "A Practical Text-Book of Pathology," by D. J. Hamilton; "A Course of Quantitative Mineral Analysis for Students," by W. Noel Hartley, F.R.S.; "School Course of Practical Physics," by Prof. Balfour Stewart, F.R.S., and W. W. Haldane Gee (Part I. "Electricity and Magnetism); "Examples in Physics," by D. E. Jones; "Inorganic and Organic Chemistry," by Sir Henry E. Roscoe, F.R.S., and Prof. C. Schorlemmer, F.R.S. (Vol. III. "Organic Chemistry," Part IV.); "Greenland," by Baron A. E. von Nordenskjöld; and "Corea," by W. A. Carles.

MESSRS. SWAN SONNENSCHEIN AND CO.'s announcements of new books include the following works:—"The Microscope," edited from the work of Profs. Naegeli and Schwendener, by Frank Crisp and J. Mayall, Jun.; "Animal Biology," by Adam Sedgwick; "British Fishes," by F. A. Skuse; "Mammalia," by F. A. Skuse; "Reptiles," by Catherine Hopley; "Ants and Bees," by W. Harcourt Bath (the last four in the Young Collector Series); "The Solomon Islands and their Natives" and "The Geology and Physical Characteristics of the Solomon Islands," with maps, by Dr. H. B. Guppy.

MESSRS. LONGMANS announce the following works of scientific interest:—"The Literary Remains of Fleeming Jenkin, F.R.SS.L. and E., late Professor of Engineering in the University of Edinburgh," edited by Sidney Colvin, with a Memoir by Robert Louis Stevenson; "Picturesque New Guinea," by J. W. Lindt; "A Manual of Operative Surgery, having Special Reference to many of the Newer Procedures," by Arthur E. J. Barker; "A Course of Lectures on Electricity, delivered before the Society of Arts," by George Forbes, F.R.S.

MESSRS. KEGAN PAUL AND CO., London, and Messrs. Appleton and Co., New York, will publish shortly the Hon. Ralph Abercromby's work on "Weather" as a number of the International Science Series. This will be the first book in the English language which deals exclusively with the nature of weather changes from day to day, as distinguished from the climatic or statistical treatment of the subject. There will be ninety-nine charts and diagrams, of which a considerable number will relate to the United States, and others to India and Australia, so as to illustrate the nature of weather on the widest possible basis.

THE additions to the Zoological Society's Gardens during the past week include a Pig-tailed Monkey (*Macacus nemestrinus*) from Sumatra, presented by Mr. B. Lynch; a Fettered Cat (*Felis maniculata*), a Spotted Eagle Owl (*Bubo maculosus*), a Hoary Snake (*Coronella cana*), four Spotted Slowworms (*Acontias meleagris*) from South Africa, presented by Dr. E. Holub, C.M.Z.S.; a Carrion Crow (*Corvus corone*), British, presented by Mrs. MacLochlin; a Martinique Gallinule (*Ionornis martinicus*), captured at sea, presented by Mr. R. Drane; two African Lepidosirens (*Protopterus annectens*) from the River Gambia, West Africa, presented by Mr. H. H. Lee; a Malabar Parrakeet (*Palæornis columboides* ♂) from Southern India, a Malaccan Parrakeet (*Palæornis longicauda* ♂) from Malacca, a Laughing Kingfisher (*Dacelo gigantea*) from Australia, deposited; a Tiger Bittern (*Tigrisoma brasiliense*) from Brazil, purchased; a Red-faced Ouakari (*Brachyurus rubicundus* ♀) from the Upper Amazons, received in exchange; a Collared Fruit Bat (*Cynonycteris collaris*), born in the Gardens.

OUR ASTRONOMICAL COLUMN.

BROOKS'S COMET.—Mr. H. V. Egbert, from observations made on August 26, 28, and 30, has computed the following elements for the comet discovered by Mr. Brooks on August 24:—

$$T = 1887 \text{ October } 6{\cdot}48\text{d. G.M.T.}$$

$$\left.\begin{array}{rl} \pi - \Omega &= 63^\circ\ 18' \\ \Omega &= 84\ \ 33 \\ \iota &= 44\ \ 10 \end{array}\right\} \text{Mean Eq. } 1887{\cdot}0.$$

$$\log q = 0{\cdot}08718$$

It will be seen that these elements bear a great resemblance to those of Olbers' comet of 1815. Dr. Holetschek, in a supplemental circular of the *Astronomische Nachrichten*, supplies the subjoined ephemeris for the comet, basing it upon the sweeping ephemeris for Olbers' comet given by Ginzel in the *Astronomische Nachrichten*, No. 2696, the comet's orbit being assumed